

ART. XVI.—*Studies in Australian Tertiary Mollusca, Part II.*

By F. A. SINGLETON, D.Sc.

[Read 12th December, 1940; issued separately 26th July, 1941.]

In the nine years since the communication of Part I. of this series, much new material has been accumulated, part of which is dealt with in the present paper, again confined to Pelecypoda, wherein the following new names are proposed and the new species figured:—

Nucula (*Ennucula*) *griceii*, sp. nov.

Nuculana (*Scacoleda*) *killara*, sp. nov.

Limopsis *werrikooensis*, sp. nov.

Glycymeris (*Vcletuccta*) *pseudaustralis*, sp. nov.

Ostrea *sinuata* *glenclegsensis*, subsp. nov.

Notochlamys *anteccdens*, nom. nov.

Aulacomya *suberosa*, sp. nov.

I am again under obligations to the Director, Mr. D. J. Mahony, and the Palaeontologist, Mr. R. A. Keble, of the National Museum, Melbourne, for continued access to the collections housed therein, and for allowing me to describe new species from them. To the late Miss J. Wilson-Smith, Mr. J. S. Mann, and Mr. G. Baker, I am indebted in respect to the illustrations.

Class PELECYPODA.

Family NUCULIDAE.

Genus **Nucula** Lamarck, 1799.

Subgenus **Ennucula** Iredale, 1931.

(*Idem* "Studies," Part I., p. 290, 1932.)

This name, proposed as a full genus by Iredale, but regarded only as a section of *Nucula* by the writer (1932, p. 292), may perhaps be accorded subgeneric rank, a course adopted by Schenck (1934, p. 46). It may be noted that in Schenck's revision he has figured from the Arafura Sea (1934, pl. 3, fig. 4) under the name of *Nucula obliqua* Lamarck (the type species of *Ennucula* Iredale) a Recent shell, clearly *Nucula superba* Hedley (1902, p. 292), which occurs in Northern Australia, whereas *N. (E.) obliqua* is confined to S.E. Australian seas.

NUCULA (*ENNUCULA*) *GRICEII*, sp. nov.

(Pl. XX., figs. 1a, b.)

"*Nucula tenisoni* Pritchard," Singleton, 1932, p. 292, pl. xxiv., figs. 5a, b. Not *Nucula tenisoni* Pritchard, Proc. Roy. Soc. Vic., n.s., viii., p. 128.

Holotype.—Shell thin, subovate, very inequilateral, posteriorly somewhat produced, moderately depressed; umbonal angle 140 degrees, anterior margin evenly rounded, posterior margin short, subtruncate; surface mostly smooth, with weak concentric folds towards ventral margin; hinge, slender, gently arcuate, with nineteen teeth, of which three are rudimentary, in anterior and six teeth in posterior series, separated by an oblique anteriorly directed resilifer; interior nacreous, shining, inner ventral margin smooth. Length 14.3; height 10; thickness of valve 3.6 mm.

Type Locality.—Grice's Creek, between Frankston and Mornington, Victoria. Balcombian (Middle Miocene?).

Type Material.—Holotype (Pl. XX., figs. 1a, b), right valve, coll. and pres. F. A. Singleton, Melbourne University Geology Department Palaeont. Coll., Reg. No. 1311.

The differences from *N. tenisoni* already noted (1932, p. 292), together with the apparent restriction of the present species to the Balcombian stage, to which the writer (1941, p. 73) would now refer the Barwonian localities at which it is found, make advisable its separation as a new species.

Family NUCULANIDAE.

Genus *Nuculana* Link, 1807.

Nuculana Link, Beschr. Samml. Rostock, iii., p. 155, 1807.

Type (by monotypy): *Arca rostrata* Chemnitz = *Mya pernula* Müller. Recent, Northern Europe.

Subgenus *Scaeoleda* Iredale, 1929.

Scaeoleda Iredale, Rec. Aust. Mus., xvii. (4), pp. 158, 187, 1929.

Type (by original designation): *Nucula crassa* Hinds. Recent, S. Tasmania.

NUCULANA (*SCAEOLEDA*) KILLARA, sp. nov.
(Pl. XX., fig. 2.)

Holotype.—Shell small, elongate ovate, moderately depressed, posterior slope flattened, bounded by a marked posterior keel; anterior end rounded, posterior end bluntly rostrate, ventral margin evenly rounded, post-dorsal margin nearly straight; umbo low, slightly anterior. Surface finely concentrically striate, sculpture stronger anteriorly and towards ventral margin. Hinge teeth chevron-shaped, about 15 anterior and 13 posterior, separated by a triangular pit. Length 10, height 5.5, thickness of valve 2 mm.

Type Locality.—Glenelg River at "Roscoe's," Parish of Killara, Western Victoria. Werrikoian (Uppermost Pliocene).

Type Material.—Holotype (Pl. XX., fig. 2), left valve, coll. and pres. F. A. Singleton, Melb. Univ. Geol. Dept., Reg. No. 1673.

This nearly smooth species distantly recalls the Kalimnan (Lower Pliocene) *Nuculana woodsii* (Tate) (1886, p. 133, pl. 9, fig. 8), which is more inflated, elongate and rostrate.

Dennant and Kitson (1903, p. 146) have recorded from "Limestone Creek," which refers to the same general locality, a worn juvenile of this species as *Leda inconspicua* Adams.

Family LIMOPSIDAE.

Genus **Limopsis** Sassi, 1827.

(*Vide* "Studies," Part I., p. 296, 1932.)

LIMOPSIS WERRIKOOENSIS, sp. nov.

(Pl. XX., figs. 3a, b.)

Holotype.—Shell ovate, subequilateral, narrowed at hinge, weakly convex; umbo minute, prominent; surface with about 40 narrow radiating ribs, interspaces occupied by fine concentric growth lines, weaker than the radial ornament. Hinge-line narrow, arcuate, bearing 9 anterior and 13 posterior hinge-teeth, slightly curved; ligament pit large, broadly triangular. Interior finely radially striate, inner margin smooth, planate. Length 18, height 18, thickness of valve 4 mm.

Type Locality.—"Limestone Creek" = Glenelg River, Western Victoria, Werrikooian (Uppermost Pliocene).

Type Material.—Holotype (Pl. XX., fig. 3a, b), left valve, ex Dennant Coll., National Museum, Melbourne, Reg. No. 14090.

This differs from its living relative, *L. tenisoni* T. Woods, under which name Dennant and Kitson recorded it, in its less oblique outline and more sloping shoulders on either side of a more acute umbo.

Family GLYCYMERIDAE.

Genus **Glycymeris** Da Costa, 1778.

(*Vide* "Studies," Part I., p. 294, 1932.)

Subgenus **Veletuceta** Iredale, 1931.

Veletuceta Iredale, Rec. Aust. Mus., xviii. (4), pp. 203, 231, 1931.

Type (by original designation): *Glycymeris flammeus* Reeve. Recent, S.E. Australia.

GLYCYMERIS (VELETUCETA) PSEUDAUSTRALIS, sp. nov.

(Pl. XX., figs. 4, 5.)

Holotype.—Right valve of an ephelbic example. Subcircular, nearly equilateral, depressed convex; umbo minute, prominent, opisthogyrate. Surface almost smooth, faintly marked by numerous fine radii, about 8 in 5 mm. at the centre of the disc, becoming obsolete posteriorly, and by extremely fine striae; the whole crossed by fine concentric lines and numerous but indistinct growth stages. Hinge-line arcuate; hinge-teeth slender, 10 anterior and 9 posterior, the latter slightly uncinat; ligamental area high, with 5 oblique striae in a space of 2 mm.; inner ventral margin strongly crenate. Length 34, height 31, thickness of valve 9 mm.

Paratype.—A larger right valve which in the gerontic stage is higher than long and somewhat truncate post-dorsally. The surface bears about 40 flat ribs, becoming obsolete anteriorly and posteriorly, with linear interspaces. Length 44, height 45, thickness of valve 13 mm.

Type Locality.—Glenelg River at "Roscoe's," Parish of Killara, Western Victoria. Paratype from Caldwell's Cliff, Glenelg River, Parish of Werriko, Western Victoria. Werrikoian (Uppermost Pliocene).

Type Material.—Holotype (Pl. XX., fig. 4), Melb. Univ. Geol. Dept. Reg. No. 1674 and paratype (Pl. XX., fig. 5), Melb. Univ. Geol. Dept., Reg. No. 1675, both coll. and pres. F. A. Singleton.

This species recalls the Recent *G. flammea* Reeve = *G. australis* (Q. and G.), which is stouter and more transversely ovate. Its minute but prominent umbo and smoother more depressed shell distinguish it from the Tertiary *G. cainozoica* (T. Woods) and *G. halli* Pritchard.

The imperfect holotype of *G. australis* var. *gigantea* Chapman from the supposed Werrikoian of Kangaroo I., S.A., figured by Chapman and Singleton (1925, p. 47, pl. 3, fig. 32) is not, in my opinion, a glycymerid, but is a lucinid, closely comparable with *Lucina philippinarum* Hanley.

Family OSTREIDAE.

Genus *Ostrea* Linné, 1758.

Ostrea Linné, Syst. Nat., ed. 10, p. 696, 1758.

Type (by subsequent designation, Children, Quart. Journ. Sci., Lit., Arts, xv., p. 44, 1823): *Ostrea edulis* Linné. Recent, Europe.

OSTREA SINUATA GLENELGENSIS, subsp. nov.

(Pl. XX., fig. 6.)

Holotype.—Shell broadly oblong, moderately large, solid, somewhat produced anteriorly to umbo. Lower valve moderately convex, with irregular concentric lamellae and obsolescent radial ribs; upper valve flattened, concentrically lamellate. Muscle scar large, ovate, excavated above, slightly posterior, weakly impressed. Length 93, height 100, thickness of paired valves 35 mm.

Type Locality.—Glenelg River above Limestone Creek, Allot. 16A, Parish of Werriko, Western Victoria. Werrikoian (Uppermost Pliocene).

Type Material.—Syntypes (paired valves), coll. and pres. F. A. Singleton, Melb. Univ. Geol. Dept., Reg. Nos. 1676 (left valve, Pl. XX., fig. 6), and 1677 (right valve).

Tate (1886, p. 110) has recorded this fossil as *O. angasi* Sow. (= *sinuata* Lam.) from Limestone Creek and Ascot Heath, and Dennant and Kitson (1903, p. 145) so list it. In the Glenelg Cliffs at Caldwell's Cliff, Ascot Heath and Dartmoor, it forms oyster beds which, from the presence of *Pecten* (*Notovola*) *meridionalis* (Tate), I have recently placed on a slightly higher horizon, probably Lower Pleistocene (1941, pp. 47, 48).

In so variable a genus, it is with some hesitation that the fossils are separated from the common mud oyster of S.E. Australia, to which they are evidently ancestral, but they differ in the greater width at the hinge, the dorsal margin being straight or obtusely angled at the umbo, and the radial ribbing practically obsolete. Victorian *O. sinuata*, s. str., is usually more shouldered at the umbo and the radial ribbing of the lower valve is well developed.

A more distant relative is the Lower Pliocene *O. arenicola* Tate, which bears fewer but stronger costae.

Family PECTINIDAE.

Genus **Notochlamys** Cotton, 1930.

Notochlamys Cotton, Rec. S. Aust. Mus., iv. (2), p. 233, 1930.

Type (by original designation): *Chlamys anguineus* Finlay = *Pecten undulatus* Sowerby. Recent, Southern Australia.

NOTOCHLAMYS ANTECEDENS, nom. nov.

Pecten praecursor Chapman, 1912, p. 36, pl. 5, figs. 1-3. Not *Pecten* (*Amusium*) *praecursor* Dall, Trans. Wagner Free Inst. Sci., iii. (4), p. 755, 1898.

Dall's and Chapman's specific names are homonyms, since they are pronounced identically and the difference in spelling is insufficient, according to the International Rules of Zoological Nomenclature, to validate the later name, for which a substitute is therefore offered.

Type Locality.—Spring Creek, Torquay, Victoria. Janjukian (Lower Miocene). Paratypes from Waurin Ponds (Janjukian) and Curlewian (Balcombian: by Chapman called Barwonian), both near Geelong, Victoria.

Type Material.—Holotype, left valve, ex Dennant Coll., Nat. Mus., Melb., Reg. No. 12590. Paratypes, ex Coll. Geol. Surv. Victoria, Nat. Mus. Reg. Nos. 12591 (Waurin Ponds) and 12592 (Curlewian).

Family MYTILIDAE.

Genus **Aulacomya** Mörch, 1853.

Mytilus (*Aulacomya*) Mörch, Cat. Conch. Yoldi, ii., p. 53, 1853.

Type (by subsequent designation, Jhering, Proc. Malac. Soc. Lond., iv. (2), p. 87, 1900): *Mytilus magellanicus* Lamarck (as of Chemnitz). Recent, South America.

AULACOMYA SUBEROSA, sp. nov.

(Pl. XX., fig. 7.)

"*Mytilus magellanicus* Lamarck." Dennant, 1887, p. 236. Dennant and Kitson, 1903, p. 146. Not *Mytilus magellanicus* Chemnitz, Conch. Cab., viii., p. 162, pl. 83, figs. 742-3. Lamarck, Anim. s. Vert., vi., p. 119, 1819.

"*Mytilus menckeanus* Philippi." Dennant, 1887, p. 236. Not *Mytilus menckeanus* Philippi, Zeit. f. Malak., iv., p. 118, 1847 (= *M. crosus* Lamarck, 1819).

Holotype.—Shell elongately subtrigonal; inflated anteriorly, compressed posteriorly; umbo acute, slightly curved; dorsal margin straight, passing evenly into the regularly rounded posterior margin; anterior margin very long, straight. Area anterior to the elevated umbonal ridge very steep, with fine radial riblets, about $1\frac{1}{2}$ per mm. Sculpture of coarse, wavy radial riblets, narrower than the interspaces, increasing by occasional bifurcation or intercalation, about 20 at the posterior margin, where they are about 2 mm. apart; on the precipitous area anterior to the strong umbonal ridge they are finer and average $1\frac{1}{2}$ per mm.; growth stages prominent. Margins very worn, but apparently smooth, with ligamental groove dorsally. Greatest length 61, greatest width at right angles 20, thickness 9 mm.

Type Locality.—“Limestone Creek” = Glenelg River, Western Victoria. Werrikoonian (Uppermost Pliocene).

Type Material.—Holotype (Pl. XX., fig. 7), ex Dennant Coll., Nat. Mus., Melb., Reg. No. 14091.

The straight (rarely concave) anterior margin, acute beaks and absence of a post-dorsal bulge at once distinguish it from *A. erosa* Lk., now living in this region. There is a closer resemblance to the Neozelanic *A. maoriana* (Iredale), in which the beaks are more curved and the ribbing slightly finer. Kerguelen shells labelled as *Mytilus magellanicus* differ again in outline and have coarser ribbing than either of the preceding.

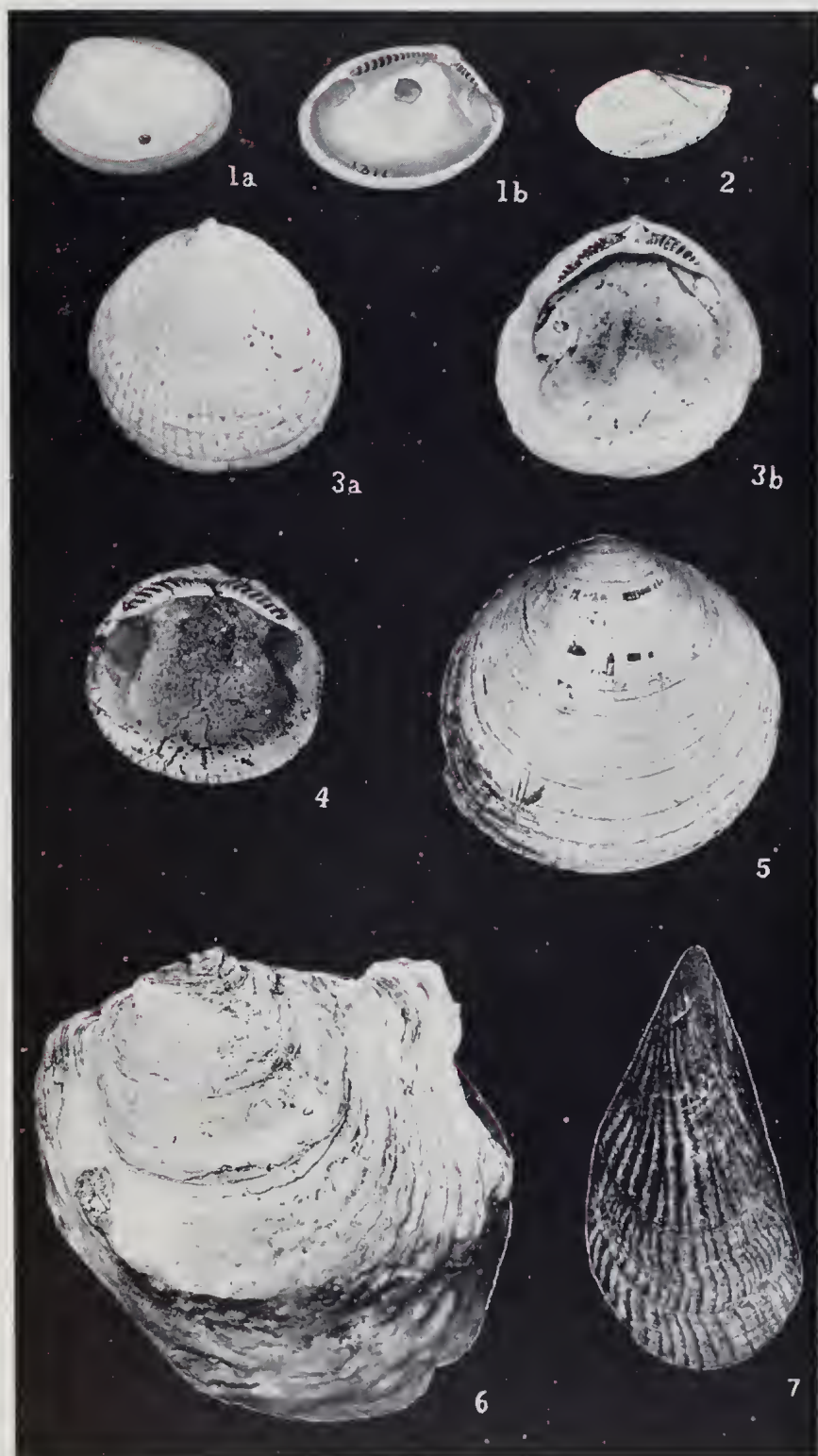
References.

- CHAPMAN, F., 1912.—On an Unnamed Species of *Pecten* from the Tertiary (Barwonian) of Southern Australia. *Mem. Nat. Mus., Melb.*, No. 4, pp. 36-38.
- , and SINGLETON, F. A., 1925.—A Revision of the Cainozoic Species of *Glycymeris* in Southern Australia. *Proc. Roy. Soc. Vic.*, n.s., xxxvii. (1), pp. 18-60.
- DENNANT, J., 1887.—Notes on Post-Tertiary Strata in South-Western Victoria. *Trans. Roy. Soc. Vic.*, xxiii., pp. 232-243.
- , and KITSON, A. E., 1903.—Catalogue of the Described Species of Fossils (except Bryozoa and Foraminifera) in the Cainozoic Fauna of Victoria, South Australia, and Tasmania. *Rec. Geol. Surv. Vic.*, i. (2), pp. 89-147.
- HEDLEY, C., 1902.—Scientific Results Trawling Expedition “Thetis;” Mollusca, Part I. *Mem. Aust. Mus.*, iv. (5), pp. 287-324.
- SCHENCK, H. G., 1934.—Classification of Nuculid Pelecypods. *Bull. Mus. roy. d'Hist. nat. Belg.*, x. (20), pp. 1-78.
- SINGLETON, F. A., 1932.—Studies in Australian Tertiary Mollusca, Part I. *Proc. Roy. Soc. Vic.*, n.s., xlv. (2), pp. 289-308.
- , 1941.—The Tertiary Geology of Australia. *Ibid.*, liii. (1), pp. 1-125.
- TATE, R., 1886.—The Lamellibranchs of the Older Tertiary of Australia. Part I. *Trans. Roy. Soc. S. Aust.*, viii., pp. 96-158.

Explanation of Plate.

PLATE XX.

- FIG. 1A, B.—*Nucula (Ennucula) grisei*, sp. nov. Holotype, $\times 2$.
- FIG. 2.—*Nuculana (Scacolella) killara*, sp. nov. Holotype, $\times 2$.
- FIG. 3A, B.—*Limopsis werrikoensis*, sp. nov. Holotype, $\times 2$.
- FIG. 4.—*Glycymeris (Veluticella) pseudaustralis*, sp. nov. Holotype, nat. size.
- FIG. 5.—*Glycymeris (Veluticella) pseudaustralis*, sp. nov. Paratype, nat. size.
- FIG. 6.—*Ostrea sinuata glenelgensis*, subsp. nov. Syntype, lower valve, $\times \frac{1}{2}$.
- FIG. 7.—*Aulacomya suberosa*, sp. nov. Holotype, nat. size.



J. W. S. et J. S. M. photos.

Australian Tertiary Mollusca.

[Page 429.]